CANADIAN ARCHITECT AND BUILDER.

VOL. VI.—NO. VIII. AUGUST, 1893 { PRICE 20 CENTS $2.00 PER YEAR.

—THE—
CANADIAN ARCHITECT AND BUILDER,
A Monthly Journal of Modern Constructive Methods,
(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),
PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

C. H. MORTIMER, Publisher,
Confederation Life Building, - TORONTO, CANADA.
Telephone 2362.
64 TEMPLE BUILDING, - MONTREAL.
Bell Telephone 2299.

SUBSCRIPTIONS.
The CANADIAN ARCHITECT AND BUILDER will be mailed to any address in Canada or the United States for $2.00 per year. The price to subscribers in foreign countries, is $2.50. Subscriptions are payable in advance. The paper will be discontinued at expiration of term paid for, if so stipulated by the subscriber; but where no such understanding exists, will be continued until instructions to discontinue are received and all arrearages paid.

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The "Canadian Architect and Builder" is the official paper of the Architectural Associations of ntario and Quebec.

The publisher desires to ensure the regular and prompt delivery of this Journal to every subscriber, and requests that any cause of complaint in this particular be reported at once to the office of publication. Subscribers who may change their address should also give prompt notice of same, and n doing so, should give both the old and new address.

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AMONG the other changes of climate incident to Canada which have taken place within recent years, is the growing frequency of wind storms, the severity of which in some instances should perhaps entitle them to be called cyclones. The wind force exerted on some occasions has been sufficient to carry away church spires, and overturn buildings which were not firmly anchored to their foundations. These cyclonic storms should form a factor in architects' calculations in the future, otherwise we may expect to see the projections on many buildings, if not the buildings themselves disappear.

WE believe it would be the means of largely increasing the interest of the members in the Toronto Builders' Exchange if at stated intervals, especially throughout the winter, meetings of a social character were held. An interesting and instructive feature of the program at such meetings would be the reading of papers by members on various subjects connected with the building business, to be followed by discussion. There is without doubt the necessary talent available for this purpose, as well as to provide entertainment of other kinds. A never ending succession of business meetings is apt to become irksome unless relieved in some way by social gatherings such as we have suggested. We therefore hope to see action taken by the officers of the Exchange in the direction which has been indicated.

THE Electric Wiremens' Union and the Bricklayers' Union, of New York, are at present engaged in a dispute as to which class of workmen is entitled to cut the holes in a brick wall required to bring the electric wires into the building. On the Mutual Life Insurance Company's new building the wiremen had been doing this work themselves. The walking delegate of the Bricklayers' Union notified the superintendent that the bricklayers would strike if the work was not given to them. When this came to the ears of the Wiremens' Union, the superintendent was advised that to hand the work over to the bricklayers would mean a strike of the wiremen. As the building was not being erected by contract, the superintendent wisely decided to cease operations and give the two unions the opportunity of fighting the dispute out between themselves. It will be of interest to learn the decision of the matter, and the method by which it was reached.

THE death is announced of Col. Auchmuty, founder of the New York Trade Schools. Col. Auchmuty, who was the possessor of an independent fortune, quitted some years ago the practice of his profession as an architect and set himself to establish an institution which would afford to the youth of America facilities for acquiring a practical knowledge of the various trades. Something was felt to be required to take the place of the apprenticeship system which was fast declining, and under which the trades unions permitted only a very limited number of apprentices to be employed. The trade school which Col. Auchmuty established met the requirements of young men anxious to learn trades, and the attendance rapidly increased until it became necessary to erect more extensive buildings designed to meet the special requirements. These buildings, erected by the students themselves, stand as an object lesson in proof of the thoroughness of the instruction imparted. The schools were from the outset bitterly opposed by the trades unions, but the endowments of $130,000 and half a million dollars given by Col. Auchmuty and Mr. J. Pierpont Morgan, respectively, have established them on a basis which will insure their future existence and usefulness.

WE lately referred to the fact that an enquiry had been received by the Dominion Government from Jamaica for ready made houses, and pointed out to Canadian builders and manufacturers that a profitable opening for business in this line might be found to exist. We now learn that Messrs. Rhodes, Curry & Co., of Truro, N. S., have embarked in this enterprise, and have recently forwarded their first shipment of houses to Jamaica. These houses require to be proof against dampness and the attacks of insects which in that country honeycomb the softer kinds of wood. To meet this requirement the manufacturers have employed Southern or hard pine. The houses are one storey in height, and in size 27 feet by 20 feet. The roof is covered by a special preparation of felt. The sides are made of panels three feet square, neatly trimmed with suitable moulding, the whole ornamented with gables and a neat cresting on the roof. Everything required in the construction of the houses was cut and fitted to its place and each piece numbered.

ITALIAN labor has of late been largely employed in the construction of railroad and other works in Canada. The Italian laborers have superseded those of other nationalities because their services can be obtained cheaper. There is, however, reason to believe that the saving to the contractor is not so great or so real as at first sight it appears. Experienced contractors assure us that Italians cannot compare with Irishmen as shovelmen. Unlike the latter they are not given to celerity of movement. We have been told of a contractor's foreman whose gang of Irish excavators was supplanted by Italians, and who was much annoyed at the lack of expedition which the latter displayed. Suddenly he bethought him of a method by which to accelerate their movements. A skillful Irish shovelman was quietly told to take his place with shovel and wheelbarrow among the Italians, and "lead them a chase." This, having no love for the Italians, he was eager enough to do. The speed at which the Italians were obliged to work in order to keep pace with the Irishman was such as they had never before experienced, and while it conduced to the contractor's profits did not enhance the friendship of the Italians for the Irishman.

THE municipal fathers of a town in northern Ontario are posing in a somewhat peculiar way as disciples of the evolution theory. It is not the evolution of the species which is engaging their attention, but the evolution of architectural ideas. Having been entrusted with the arrangements for the erection of a new town hall and market building to cost nearly $20,000, their first resolve seems to have been to avoid having anything to do with an architect. Their next step was to call in a local carpenter and ask him to prepare a rough design. Having secured this, they instructed one of the builders in the town to prepare the plans, which, on examination, met the views of some of the members of the Council but were declared by others and by the majority of the citizens to be unsuitable. In order that this important point may be satisfactorily decided, it has now been found necessary to procure the opinion and advice of an architect. It is to be hoped that the evolution theory will now be abandoned in favor of common sense methods, and that in the case of this and other works of like importance, the saving of a few hundred dollars in architects' fees will not be accomplished at the sacrifice of architectural beauty and utility.

COMMERCIAL depression seems to exist at present throughout the world. In Europe business conditions are far from satisfactory. The recent financial crisis in Australia and in the United states at the present time have laid in ruins many business enterprises in these countries, and has given rise to a widespread feeling of alarm. In the city of New York alone at the present time reports from the various trades unions show that, out of a total of 99,950 members, 36,177, or 37 6-10ths per cent, are unemployed, while the total number of unemployed workmen in the city is placed at 100,000. In the case of some trades, as for example that of plumbing, over 50 per cent. of the union workmen are reported to be out of employment. This condition of affairs across the border is likely to be accentuated in the west at least by the closing of the World's Fair a month hence. The Builders' and Contractors' Association of New South Wales decided some time since to reduce the wages of all workmen in the building trades by 10 per cent. For a time a strike of the workmen threatened to be the result, but more common sense counsels prevailed, and the reduction was accepted. Canada, too, has been passing through a time of depression, but owing to her magnificent banking system, her agricultural resources, and the absence to a great extent of the speculative spirit among her people, she has thus far escaped disasters such as have overtaken her neighbors. With the prospect of a harvest of unusual abundance, there is good reason to hope that the situation in Canada will steadily improve.

SOME interesting evidence was lately given by Mr. Stanley G. Bird, a well known master builder of London, before the Royal Commission on Labor. Mr. Bird testified that the cost of labor in the building trades had doubled within the last thirty-five years; that brickwork which then cost 40s. a rod, costs now from 80 to 90s. The surprising part of the testimony was, however, the statement that notwithstanding the great increase which had taken place in the rate of wages, the workman of to-day did not accomplish more than half the amount of work which his predecessor was accustomed to do. The witness stated that where it used to be the custom for a good bricklayer to lay a thousand bricks a day, three or four hundred is about the usual thing now. With regard to joinery the witness said, that although the workmen are given the use of machinery, the labor costs just as much as it did twenty-five years ago, when the men had to cut the stuff out of the deal, strap it up, square it up and work it. In answer to the enquiry of the examiner, Mr. Bird plainly said that the workman of to-day, instead of doing a fair day's work, does as little as he can. These statements were corroborated by a number of other builders present. While they certainly do not apply to all workmen, they are no doubt correct as regards the majority, and the condition of affairs which they reveal is far from being creditable to unionism, to the influence of which the change is chiefly due. In Canada the rate of wages has similarly advanced. As to the return given by the workman of to-day as compared with a former period, we are not in a position to speak with authority. The rise of wages alone, however, has been sufficient to largely increase the cost of building; notwithstanding, contractors are obliged to take work at lower figures than ever before. Instead of the increased cost being a charge upon the owner of the building, as it properly should be, keenness of competition necessitates that it come out of the profits of the contractor, and in many instances it is sufficient to turn profit into loss.

THERE is no more important subject that can engage the attention of the Architectural Associations of Ontario and Quebec than that of the proper education of students. By the liberality of the provincial Government of Ontario, a Department of Architecture has been established in connection with the School of Practical Science at Toronto, and the beneficial influence arising therefrom is already manifest. The Department of Architecture has been warmly endorsed and supported by the Ontario Association of Architects, and will no doubt grow in efficiency and exercise a marked influence upon the architects and architecture of Canada in the future. Unfortunately the architectural students of the Province of Quebec are at present without any means of securing instruction other than that which they may obtain by serving a term in an architect's office. While experience of this kind is most important and necessary, something more is required to equip the architect of the future to practice his profession in a manner that shall bring honor to himself and to the community in which he labors. Commendable attempts have been made to impart instruction to the students in Montreal through the medium of classes and lectures under the direction of leading members of the Province of Quebec Association of Architects, but with indifferent success. Teaching is itself a profession, and very few architects, however large the stock of information which they may have acquired, are possessed of the faculty of successfully imparting their knowledge to others. What is required is a Department of Architecture to be established in connection with McGill University. To this object we hope to see early and determined effort directed by the architects of the Province. All the accommodation which such a Department would require already exists in the splendid Technological School which has recently been erected. It only remains for

some wealthy citizen to endow a Chair of Architecture and by so doing take rank among the men whose illustrious gifts have been the means of placing this University in the foremost position which it now occupies amongst the educational institutions of the world. We trust that at the approaching annual convention of the Province of Quebec Association of Architects this subject will receive the earnest attention which its importance demands.

ILLUSTRATIONS.

QUEEN'S HOTEL, MONTREAL—A. F. DUNLOP, ARCHITECT, MONTREAL.

The building is situated at the corner of St. James and Windsor streets, near the Bonaventure Railroad depot. It is thoroughly fireproof. The walls are lined with terra cotta fireproof material, the floors and roof being constructed with rolled steel beams, filled in with terra cotta arches and strengthened with shell built angle columns. The principal interior walls are constructed of brick, and the whole façade of imported Scotch sandstone.

CHRIST CHURCH CATHEDRAL, OXFORD, OXFORDSHIRE—SKETCH BY MR. E. G. BIRD.

The accompanying sketch is a view looking towards the choir through the Lantern Tower from the North Transept. The earliest annals of this church date back to Saxon times and connect themselves with the almost legendary history of a renowned priory founded by St. Fredeswide, who died in 740 A. D. The Cathedral as it is to be seen now, was commenced in 1120 A. D., by Prior Guimond, and completed in 1180 A. D., and is a very interesting architectural type of the transition period between the Norman and early English styles. The roof of the choir is the work of Cardinal Wolsley in the beginning of the 16th century, and except in size, it is one of the best and most remarkable ever executed.

C. A. AND B. COMPETITION FOR A SERVICE PANTRY—DESIGN BY "SPERO MELIORA" (MR. ERNEST WILBY.)

COMPETITIVE DESIGN FOR ST. JOHN'S EPISCOPAL CHURCH, TORONTO—AWARDED SECOND PRIZE—J. FRANCIS BROWN, ARCHITECT, TORONTO.

COMPETITIONS.

FIVE sets of plans were submitted in the competition for plans for the improvement of St. Lawrence Market, Toronto, for which $1,000 in prizes was offered by the City Council. The judging of the merits of the designs was done by the aldermen. The first prize was awarded to Mr. H. G. Paull, the second to Messrs. Strickland & Symons, and the third to Mr. A. W. Peene, all of Toronto. The cost of carrying out Mr. Paull's design is estimated at $71,000.

LEGAL DECISIONS.

AN action has been tried in the Irish Queen's Bench Division, with the Secretary of State for War as plaintiff, the defendant being Mr. John Good, a builder, the particulars of which we find recorded in the *Builders' Reporter*. The plaintiff claimed 405*l.* damages for alleged breach of contract in regard to the proposed erection of certain buildings at the Currah Camp Co., Kildare, and in respect of which the defendant was to receive 4,995*l.* The plaintiff alleged that it was a term of the contract that upon the expiration of two weeks from the time of receiving possession of the site the works should be commenced and proceeded with with all due diligence, so that the brickwork should be finished and the buildings roofed and completed within nine months. It was further stipulated that if the defendant failed to commence at the date mentioned and proceed in the manner agreed upon, the plaintiff should be at liberty to make any other contract for the completion of the works upon such terms as to the plaintiff should seem best, and to charge the excess of cost to the defendant. The site was handed over to the defendant in accordance with the contract, but he did not proceed with the works, and the plaintiff, owing to the default of the defendant, was compelled to make a contract with another contractor, and the plaintiff had to pay this other contractor the sum of 5,400*l.* for the works contracted to be built and completed by the defendant, being an excess of cost of 405*l.* over the amount agreed upon by the defendant.

RESIDENCE ON BATHURST STREET, TORONTO, FOR J. R. DUNN.—HENRY SIMPSON, ARCHITECT.

The defence was a denial of the terms of the contract, and that it was a term of the contract that in the event of the combination or strikes of workman or other causes beyond the contractor's control the defendant should be excused and discharged from the performance of the terms of the contract. The defendant stated that he duly commenced and proceeded with the works, but shortly after the commencement a strike for an advance of wages occurred amongst the workmen and labourers employed by the defendant on the works, and by reason of the strike the defendant was prevented from proceeding with and completing the works pursuant to the contract, and under its terms he became discharged from the performance thereof. It was denied that he was guilty of any default in relation to the contract; that it was by reason of any default of his that the plaintiff was compelled to make a contract with another contractor for the building and completion of the works, or that the plaintiff had made another contract, or that he had paid to another contractor the sum of 5,400*l.* in regard to the works.

Mr. Justice Holmes submitted the following questions to the jury:—Whether the works were delayed by reason of the strikes of the workmen, and was satisfactory proof of this given to the Secretary of State for War.

The jury found for the defendant.

QUESTIONS AND ANSWERS.

[Readers are invited to ask through this department for any information which they may require on lines consistent with the objects of the paper. Every effort will be made to furnish satisfactory answers to all such inquiries. Readers are requested to supply information which would assist us in our replies. The names and addresses of correspondents must accompany their communications, but not necessarily for publication.]

Wilson Bros., Collingwood, Ont., ask: What is the correct weight of 1000 feet of inch lumber, maple and pine, dressed and undressed?

ANS.—The weight of undressed inch maple lumber is 4½ lbs. to the foot, and when dressed, 3½ lbs. to the foot.

"Architect," Montreal writes:—In the Province of Quebec, a considerable burden of ice accumulates on the roofs of buildings, and this must be taken into account by the architect in designing roofs. I have not been able to obtain any very definite information as to the weight of ice which would assist me in making my calculations, and would feel obliged if you could enlighten me on the subject.

ANS.—The weight of a cubic foot of ice is about 57 lbs.

PROVINCE OF QUEBEC ASSOCIATION OF ARCHITECTS.

THE semi-annual examinations for matriculation and registration of the Province of Quebec Association of Architects were held of the 27th and 28th of July. Six candidates presented themselves for examination, of whom the following four were successful: M. Helbronner, P. Sicotte, Frank Peden and J. A. Deschamps. The examiners were Messrs. A. T. Taylor, J. Haynes and A. C. Hutchison, and the examinatons comprised arithmetic, mensuration, algebra, geometry and free hand and linear drawing. There were no candidates for the final examination.

The next annual meeting of the Association will be held in the city of Quebec on the 28th of September. Arrangements are not yet completed as to the proceedings, but the secretary is now in comminucation with the members at Quebec regarding this.

IN FAVOUR OF COMPETITIONS.*

From my point of view, it is a mistake to suppose that the profession can dispense with healthy, stimulating competitions. A man never knows what is really in him until he has measured himself with his fellows in real honest work of this kind. Consider what a large field for effort is presented to our younger men at the outset of their career, when youth, with its enthusiasm and capacity for work is so strong. With many, the commissions which they have in hand fail to fully occupy their time. Does not the opportunity thus afforded, through the medium of competitions, and which I think is confined to our profession, create, if grasped, a lasting habit of steady, continuous application and activity, a prelude to the time when hands and head will be fully occupied on more certain work.

Let me remind you of the endless opportunities which cross our path through the medium of competitive problems, for the study and investigation of the many kinds of architectural structures the architect of to-day is called upon to design. Frequently are we compelled before making a new venture, to seek, and then to thoroughly satiate ourselves with the ideas and treatment we find in the best and most successful work of perusal of illustrations, as well as by a personal inspection of their structures. Can anyone, on reflection, fail to see the helpful and lasting influences that must accrue from such a probation, even if no other advantage be the immediate outcome of the effort? How can we achieve success, if we learn no lesson from our failures? The knowledge and grasp of the requirements of any structure thus acquired, as well as the familiarising of one's self with the mind and method of some eminent specialist, probably the "facile princeps" in the particular class of work attempted undoubtedly will be a clear gain to the earnest competitor, and from my own short experience I can affiirm the result will be a joyous one, and will, in the near future, bear succulent fruit. Is not the trend of some of our younger men, who look askance at competitive work, to drift into that self satisfied and crystallised state (so aptly described by Sir Joshua), from which their work ultimately becomes reduced from mere architectural barrenness, to the poorest of all imitations—having to repeat what they have before often repeated.

We may love and reverence the past as archæologists, but, as architects, let us not forget that archæology is the bone of living progressive Architecture, and if our art is ever to evoke popular enthusiasm it must do so by embodying the thoughts, the aspirations, and the genius of the living people for whom we build.

There is one more thought so intimately connected with the whole question, viewed from the professional side, that I think it ought not to be passed over without comment, however brief. It is the deplorable preponderance of misdirected effort competitive work produces. One is confronted in almost every competition with the melancholy sight of many very meritorious architectural productions, possessing picturesqueness of grouping, excellent proportions, combined with artistic and well-designed detail, yet having all chance of their success nullified by the utter unsuitability of the design, and which is frequently mated to an indifferent and ill-considered plan. These artistic and impractible productions are greeted with the admiration both of the prefession and the general public, but, alas! command nothing more substantial. Those who allow their prolific pencil to have the upper hand—resulting not infrequently in relegating to quite a secondary consideration the actual needs and inexorable stipulations of "Competitive Instructions" given for their adherence, and who prefer to follow the bent of their own sweet will and pleasure—are only amusing themselves. It is misapplied energy, and any chance of probability there is of their clever but impracticable design being chosen, becomes merely a "vision of their own romance."

With regard to the etiquette aspect of competitions, there is still floating about, even among many practising architects, who on other matters are not without intelligence and discernment, that strange notion that to be engaged on competition work is somehow derogatory from a professional point of view. These men (who ought to know better) carelessly deprecate in very doubtful taste the praiseworthy efforts made by their more enthusiastic and energetic fellows, through this medium presented to them. I feel very confident, indeed, that those who look with lukewarmness, if not with absolute hostility, on the many opportunities thus open for the obscure professional man, probably, as Gray has it, "A youth to fortune and to fame unknown," to further his advancement and to ultimately achieve success, have really never been reasoned into the position and attitude they take.

In the first place, by this method, a strong belief and advocacy in the policy of universal "Free Trade" is shown, the soundness of which, I venture to affirm, no one will be prepared to question, and thus is secured by the market the privilege of purchasing in the open market. Liberty also is afforded for any qualified practitioner to dispose of his wares (*i. e.*, the product of his brains and skill), wherever that kind of merchandise is in requisition, and thus a wide field of additional opportunity and usefulness is opened out to us, and which may largely conduce to the greater prosperity of our profession. Again, the competitive system is largely instrumental in bringing about an entire immunity from those petty jealousies which we all deplore, but which are frequently experienced in many provincial towns, where several practitioners are about equal in status, professionally and socially. If competitions be framed and conducted on strictly equitable lines (which is of paramount importance, and to which I shall shortly refer), then the spirit of emulation being stirred, each competing architect is dependent entirely on the merit of his effort, and not on the number and the influence of his friends; then it follows that the discreditable and unprofessional touting, which is greatly to be deprecated, but which, alas! is only too frequently resorted to, at once ceases, and a more honourable and equitable state of things is adduced.

There is one other advantage I should like to point out that the public obtain through their encouragement and adoption of competitive work. It is the benefit of having any contemplated architectural project attacked by a number of distinct minds, and the results submitted for their inspection and choice. Frequently one's attention is arrested, whilst inspecting competitive designs, by some that exhibit a freshness of conception, an originality, and a boldness that doubtless has been drawn out by their authors zeal to excel, and which, I venture to state, would not be obtained through any other agency. No more being attempted than is done, but a faithful performance of what is undertaken to be performed.

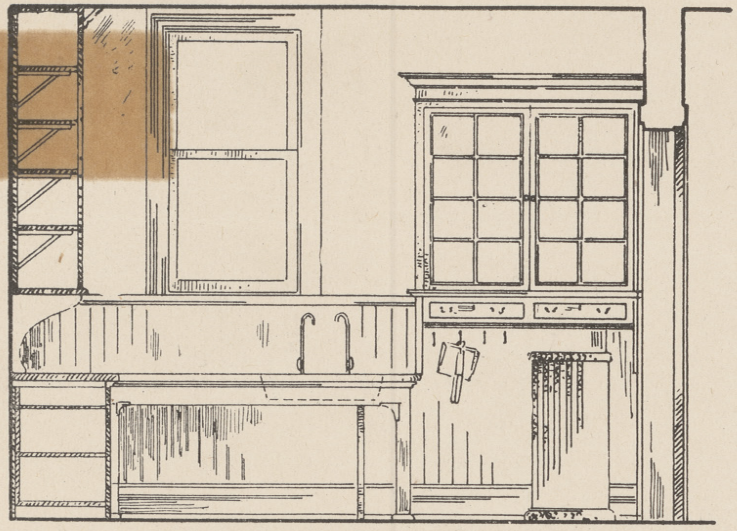
Many of us will recall with pain the heartburning and strong sense of indignation we have been occassionally subjected to by a flagrant deviation from rectitude and fair dealing on the part of the promoters in some competition, into which we have been cajoled to enter the lists. The indifference displayed by such unscrupulous people to the inexhaustible patience, time, and labour that architects have fruitlessly given, is so inconceivably deplorable that it will hardly bear discussion. The question as to how this particular evil is to be remedied forms part of a larger question affecting the whole subject. But are we not all "masters of our fates"? Does not the blame for such a state of things chiefly rest with ourselves, and have we not the remedy mainly in our own hands? It is invariably the case that in these "questionable" competitions, neither are the "instructions, drawn up" on lines suggested by the Institute, or by some practitioner (a man of repute), nor is any mention made in same as to the promoter's intention to call in a professional man to advise them in arriving at a decision. With these very ominous omissions clearly before us, it is our duty to our profession, as well as to ourselves, to leave all projects framed on such doubtful lines severly alone, and I for one shall gladly welcome the day when every practising architect shall consider it his duty as well as his privilege to become a zealous and enthusiastic supporter of the Royal Institute, thus further to strengthen its hands by which alone it can seccessfully cope with some of the disabilities we still have with us.

* From a Paper read before the Manchester Society of Architects.

An action has been entered by the management of the Dominion Bank with the object of preventing the Baldwin Estate from building upon a light area on the west side of the bank building on King street, Toronto. It is claimed that the lease of the land on which the bank stands covers also the area.

CANADIAN ARCHITECT AND BUILDER:

COMPETITION FOR A SERVICE PANTRY SUBMITTED BY "SPERO MELIORA"



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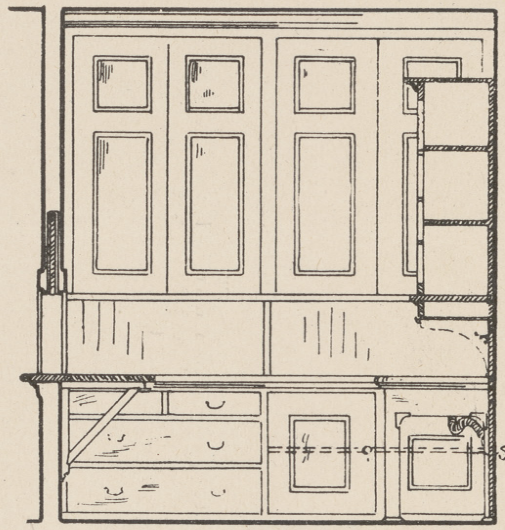

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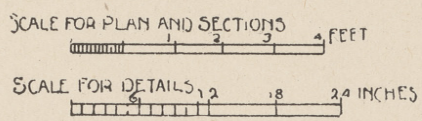

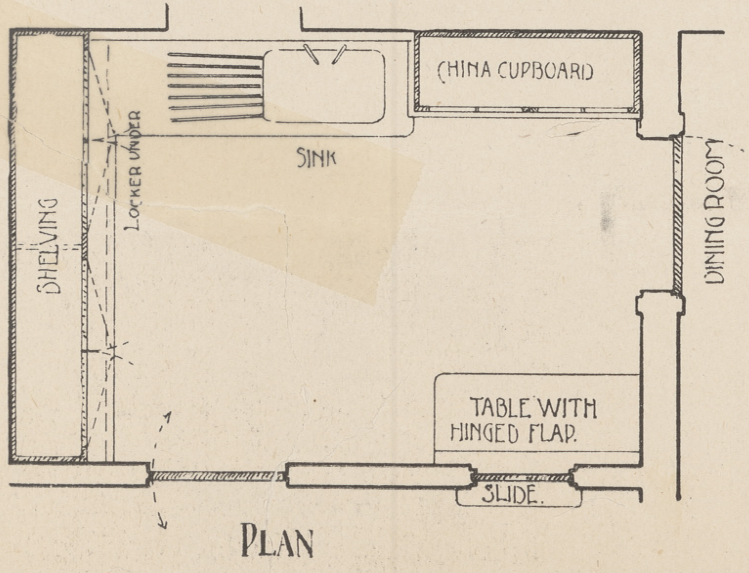

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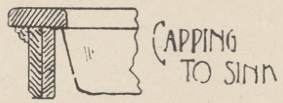

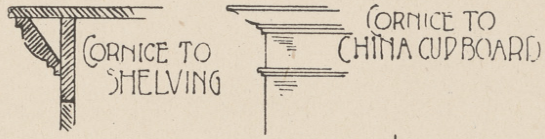

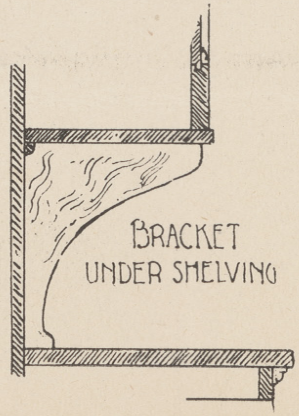

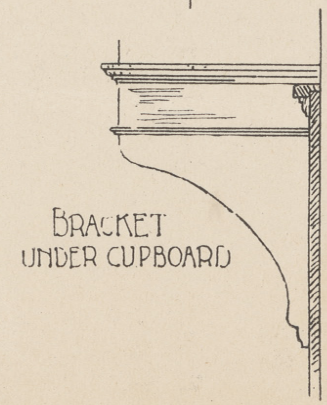

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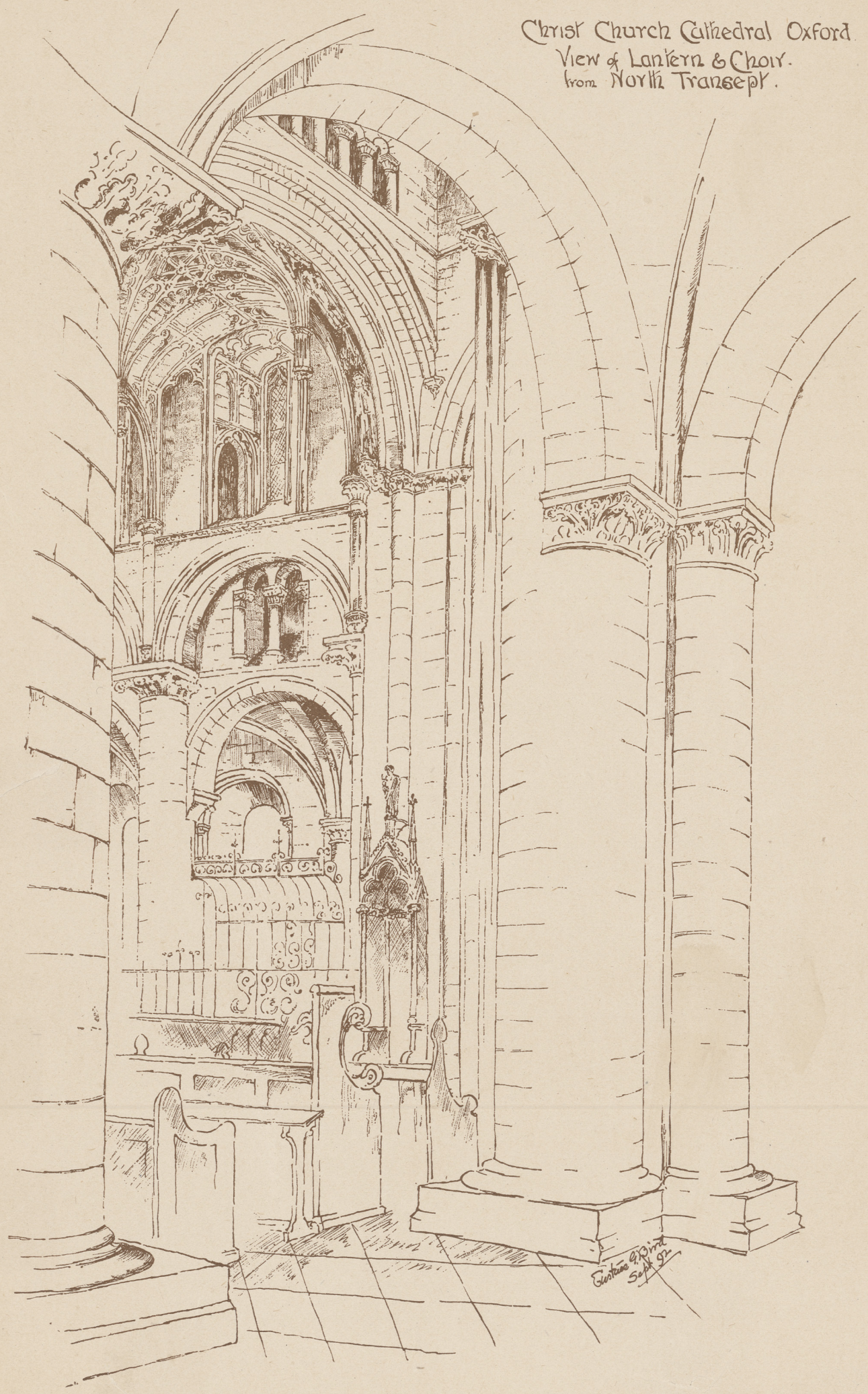
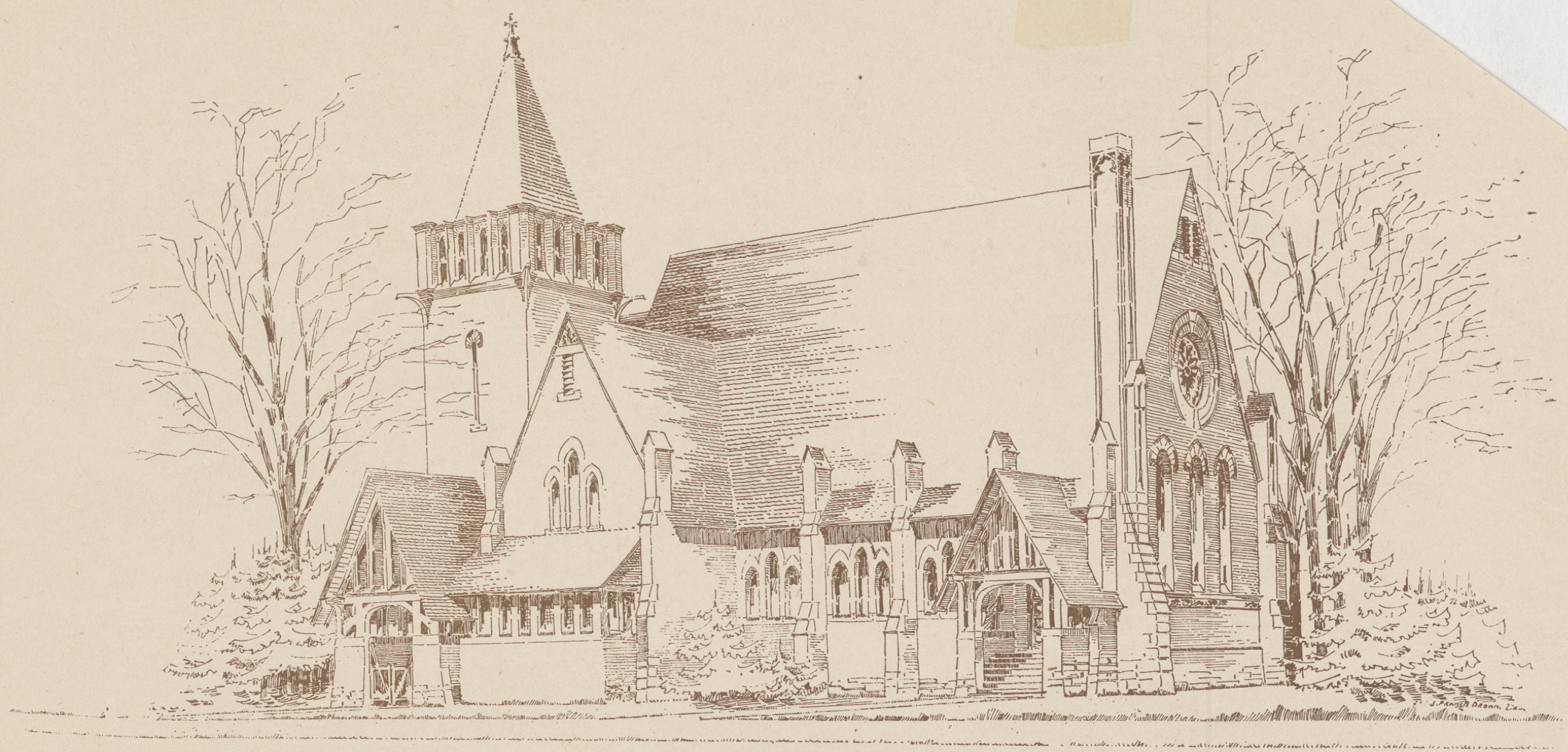


Sketch of Lantern and Choir, Christ Church Cathedral, Oxford.

By Eustace G. Bird.



COMPETITIVE DESIGN FOR ST. JOHN'S EPISCOPAL CHURCH, TORONTO.—AWARDED SECOND PRIZE.

J. FRANCIS BROWN, ARCHITECT, TORONTO.

ORNAMENTAL TREATMENT OF IRON. *

IRON has great cause to be dissatisfied with the mode of ornamental treatment it has received. Its special qualities as a building material have conferred such general advantages that it is a matter for regret we do not pay the attention to its appearance that we give to it in its purely useful capacity. The generous aid which it lends to us in the solution of our building diffculties and the manner in which, by its use, we are enabled to do so much that was hitherto impossible, surely demands that its worth shall cease to be covered by imitative and unsuitable designs. Who is the engineer or architect that has not had reason to be thankful for its aid, perhaps as a girder in getting over a troublesome span where intermediate supports would have been objectionable; or by its use as columns in the little lateral space taken up in proportion to the work done, and where by reason of its bulk stone would have been inadmissible, and in return the mean action is taken of covering up the iron girder with wood and cement, and by painting and sanding, making it look like a stone lintel, which could never have done the work. Or in the case of a column, by moulding it after a Classic model, totally ignoring the very palpable fact that by its lean shaft all the proportions of the model are lost. On no account should any of theClassic columnar Orders be applied to it, for if enough of iron is used to retain the usual proportions waste of materials is bound to occur, and, on the other hand, if the use is made economically the ratio of thickness to height is sure to result in a sickly and lean effect. The advantage of iron is that it enables us to do the work required with much less bulk than if stone, brick or wood were used; therefore it is contended that it is contrary to the ethics of good design to make it appear like those materials when doing its superior work. In the case of the girder or truss surely there can be no logical objection to their straightforward exposure. The rivets and the L irons could easily be left to make a presentable appearance. An example of a girder exposed is to be found in the front of a recent large building erection in Sydney, and it must be admitted that its calm, dignified and straightforward appearance is not unpleasing. The flanges and L. irons have been carefully worked, and the heads of the rivets left very clear; but beyond this there is nothing in the way of ornamentation, and none is wanted, for where it has to do laborious work a simple but effectual appearance is the best, and it would be entirely out of place fancifully to ornament it. Deference must of course be paid to the necessity for sheathing the iron columns and girders with fire-resisting material; but this is not always necessary, for there have been one or two examples of iron columns and girders so constructed and arranged that by means of a fusible plug in case of a fire, a continuous stream of cold water will circulate throughout them, provision also being made that all cradles and seating should have similar benefit; and an able paper was read before the Engineering Association of New South Wales touching on the subject, which will be found in the *Proceedings* of that Institute for 1892. Wrought iron is capable of lending itself to very delicate and artistic treatment, and recourse to it should always be taken to give the necessary contrast to the heavier and more substantial construction. Gates, grilles, railings, finials, etc., are excellent chances to treat in a light way, and the most beautiful results can be obtained. Every designer can appreciate the addition to the proportions of a building which a raised and curved roof makes, and the strength and pliability of wrought iron in every way conduces to the easy attainment of such roofs. Sir Gilbert Scott in *Gothic Architecture, Secular and Domestic*, expresses the opinion that "there can be no doubt that the iron roof is susceptible of exquisite beauty." And it would indeed be difficult to prove the contrary. But unfortunately it is seldom that even an attempt is made to gain such a result. It is, however, in its cast state that most of the anomalies exist. At the present there is a term—"cast-iron impudence," which is freely used, and actually it might be suggested that it had its origin in the glaring and impudent manner in which cast-iron ornament is plastered over our buildings. It is not going too far to say that almost 80 per cent of recent erections in the colonies have in some way been made to rely on this stuff for appearance, and yet at the same time it would be impossible to find more than about six different designs amongst the whole. In every city and town is to be found the cast-iron shop, the keeper of which has set out on the walls the same monotonous display of specimens to be found in every other place of a like nature. He calls each design by some fanciful but totally inappropriate name. He sells it by the foot, it is put up by the foot and the result is a never-ending array of yard after yard of cast-iron, soutterly bereft of any variety or beauty as to be positively offensive to a tasteful eye and totally stamp out even a spark of regard for cast-iron. It is not only the want of variety or beauty in the design, but also the roughness of the casting, no care being taken to preserve a good surface or sharp edges; and the casting very often appears a confused mass of dots and lumps. It must not be thought that the purpose of this paper is to entirely condemn the principle of treating it for ornamental purposes; but some improvement might be made with advantage in the habit of making in cast-iron an attempt to resemble, for instance, ferns or other vegetable forms. Cast-iron should not be used for purposes of ornamentation only, but rather primarily as meeting a necessity and then ornamented to make presentable. As an instance, might be taken a column in a store, the plain shaft of which together with a simple and unostentatious cap merging in a cradle with bracing studs, is far better and more in place than to have an elaborate thing in Corinthian style put in somewhere in the front, with no other reason for its existence than that it is intended to make a nice appearance; or again, would it not be far better to just have a little, but suitable wrought-iron work, judiciously used, than all the cast-iron fringes, crests, brackets and finials, which are so unmercifuily used? Cast-iron is best used only when compressive strain is to be resisted, and in such cases it should be very unostentatiously beautiful. If used only for ornamental purposes the greatest care should always be exercised not to indulge in an excess which is so tempting on account of the ease with which such is produced. All materials which allow of being moulded or cast, and thereby easily multiplied, conduce to quantity in large proportion, to trouble in production, and human nature is so fond of display that the inevitable result is over bearing and debased ornamentation; not so much the consequence of itself in its parts being bad, as because of being in direct violation of the rule—"that of the best we may have too much."

* From a paper by Mr. Jas. Mangle, read before the Engineering Association of New South Wales.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

A decision has just been rendered by Judge Delorimier of the Superior Court upon a novel and important point. Mr. Alex. Hurtubise, against whom the late Mr. J. J. Brown, architect, brought action for $30,000 damages for injuries sustained by being run over on the public highway, petitioned for an order to compel deceased's family to allow an autopsy to take place, the petitioner's contention being that such an autopsy would reveal the fact that Mr. Brown died of diabetes, and not from the injuries received. The judge refused to grant the petition, on the ground that although Mr. Hurtubise had a real interest in the matter, still the court could not take upon itself to protect an individual interest by violating the general principle which makes the home of each family a castle that must be respected in its sanctity and privacy.

A movement is on foot to have a boulevard constructed of the width of 150 feet from the market on St. Lawrence Main street to St. Denis street, with the Monument Nationale at one end and the new Laval University building at the other.

A recent examination by the Inspector of Buildings revealed the fact that the spire of St. Andrew's church has shifted about six inches in a north-easterly direction. In consequence steps have been taken to anchor it more firmly.

Thomas Evans and Edward Reil have registered to carry on business as general contractors.

Upwards of $200,000 is said to have been expended last year in making extensions and improvements to hotel buildings in this city for the purpose of accommodating the crowds of visitors who were expected to stop over here en route to or from the World's Fair. The crowds have failed to put in an appearance, and the hotel owners are lamenting their fate.

Death is rapidly thinning the ranks of senior Montreal architects, three of whom have been called away within the last year. The last to be cut down was Mr. John James Browne, who died at his home in this city at an early hour on Thursday, the 3rd inst. Mr. Browne received serious injury by being knocked down by a horse and sleigh on the street in Montreal last November, and although for a time he rallied, the accident appears to have induced an attack of Bright's disease to which he eventually succumbed. Mr. Browne was born in the city of Quebec on the 12th of October, 1837, and was educated at the High School in that city. He began the practice of architecture when nineteen years of age, and obtained second and first-class certificates as the result of a post-graduate course under the celebrated engineer and architect, Lord Russell. He had an extensive practice in this city and province. He was elected a member of the Council of the Province of Quebec Association of Architects at the last annual convention. He was also a member of the Montreal Board of Trade and a Justice of the Peace. A wife, three sons and three daughters are his survivors.

LONDON.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

A well-known contractor of this city writes: I observe in the London correspondence of the ARCHITECT AND BUILDER for July the statement that there is a good opening in this city at present for outside contractors, owing to the limited number of bidders and the large amount of work in progress and projected. Your readers are told that for want of competition the cost of buildings is maintained at such high figures as must tend to retard building enterprise. This is far from being a correct presentation of the situation in this city. The facts are that at present the number of resident contractors is more than sufficient to provide active competition in tendering for all contracts. As regards prices, they are barely sufficient to cover the cost of the work and leave a slight margin of profit to the contractor. Surely it is not desired that contractors should work for nothing. An attempt is being made by some of our local architects to introduce some of the features of modern American architecture into their designs, especially in residence work. The local contractors not having had experience with work of this class, do not know with any degree of definiteness what he cost of execution may be. In submitting tenders, therefore, they increase their bids for this class of work as compared with the work to which they have been accustomed, to the extent which they deem necessary to cover the extra cost of its execution. This is all the foundation that exists for the statement that prices have advanced or are higher than usual.

HAMILTON.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

Mr. George Webb, a well-known builder of this city, was recently summoned before the courts at the instance of the Building Inspector, on a charge of violating the city building by-law. The offence alleged consisted of covering with wood instead of metal the tower of a church building. Mr. Webb showed that the wood covering of the tower was cased with brick, whereupon the magistrate dismissed the case.

The expenditures of the Board of Works have already exceeded the appropriation by the sum of $10,000.

The residence of Mr. James Balfour, architect, was recently ransacked by burglars.

The significant statement appears in one of the daily papers that while the building permits for a given month aggregate $57,675, the actual building operations have been much more extensive. In other words the building by-law, which requires a permit to be obtained prior to the commencement of every building, is not enforced.

HANDY TABLES OF DIMENSIONS OF JOISTS AND RAFTERS.

FOR ready use in the office the following tables, submitted by H. Maack, Principal Academy of Architecture and Building, St. Louis, through the *Southern Architect*, will be found practical and time saving. No development of formula is required, but simple multiplicatiou of the clear span in feet by the factor hereafter given will give the desired width of joists or rafters for any span for 2″ joists. For 2½″or 3″ joists, it will be required to use the formula, but in the common buildings 2″ joists are generally used and the free bearing length or span can be readily taken from the plans. It will therefore only be necessary to find the varying width or breadth, and this will vary according to the load or span.

The tables are computed from the formula:

$$h = \sqrt{\frac{p \times l \times 3}{k \times t \times 4}}$$

in which the letter

h = height, breadth or width of joists or rafters in centimeters.
l = length or span of joists or rafters between support in centimeters.
t = thickness of joists or rafters in centimeters.
k = safe load, for yellow pine 60 kg., and for white pine 50 kg. per square cm. of section area, with a safety factor of 10.
1 kilogram (kg.) = 2.2 pounds
1 meter (m) = 3′ 3⅜″ = 3.28 feet = 100 centimeters(cm.) = 1000 millimeters (mm.)

TO FIND THE BREADTH = H.

For ready use of the tables the value "l" is already transformed into feet, and the clear span or length of joists or rafters between supports = l, must be used therefore in feet only.

OWN WEIGHT OF CONSTRUCTION, AS JOISTS, CEILING AND FLOORING.

Per square foot—2″ × 10″ joists—16″ to center 12 lbs., 12″ to center 15 lbs.

Per square foot—2″ × 12″ joists—16″ to center 15 lbs., 12″ to center 18 lbs.

Per square foot—2″ × 14″ joists—16″ to center 18 lbs., 12″ to center 20 lbs.

Per square foot—2″ × 6″ ceiling joists and 1″ plaster and lath, 16″ to center 15 lbs.

Per square foot—horizontal measurement of roof, including wind and snow, 50 lbs.

The loads given in the tables include the load of the construction.

TABLE I.

FOR DWELLINGS AND FACTORIES USING LIGHT MACHINERY.

Supposed load on the square foot floor space = 80 pounds.

2″ joists 16″ to center; h = 1 ft. × .75 (¾)″ yellow pine or × .8 (4-5)″ white pine.

2″ joists 12″ to center; h = 1 ft. × .66 (⅔)″ yellow pine or × .7 (7-10)″ white pine.

TABLE II.

FOR STORES.

Supposed load on the square foot of floor space = 110 pounds.

2″ joists 16″ to center; h = 1 ft. × .9″ for yellow pine.

2″ joists 12″ to center; h = 1 ft. × .77″ for yellow pine.

TABLE III.

FOR DANCING HALLS, HAY AND FRUIT STORES.

Supposed load on the square foot of floor space = 150 pounds.

2″ joists 16″ to center; h = 1 ft. × 1″ for yellow pine.

2″ joists 12″ to center; h = 1 ft. × .9″ for yellow pine.

TABLE IV.

FOR SALT WAREHOUSES AND WORKSHOPS USING HEAVY MACHINERY.

Supposed load on the square foot of floor space = 175 pounds.

2″ joists 16″ to center; h = 1 ft. × 1.13″ for yellow pine.

2″ joists 12″ to center; h = 1 ft. × .98″ for yellow pine,

TABLE V.

FOR GRANARIES.

Supposed load on the square foot of floor space = 200 pounds.

2″ joists 16″ to center; h = 1 ft. × 1.2″ for yellow pine.

2″ joists 12″ to center; h = 1 ft. × 1.″ for yellow pine.

TABLE VI.

FOR WAREHOUSES IN GENERAL.

Supposed load on the square foot of floor space = 220 pounds.

2″ joists 16″ to center; h = 1 ft. × 1.25″ for yellow pine.

2″ joists 12″ to center; h = 1 ft. × 1.1″ for yellow pine.

TABLE VII.

CEILING JOISTS.

Supposed load of construction, *i. e.*, joists and plastering = 15 pounds per square foot.

2″ joists 16″ to center; h = 1 ft. × 24″ (¼)″ yellow pine, or × 3 (⅓)″ white pine.

2″ joists 12″ to center; h = 1 ft. × ¼″ white or yellow pine.

TABLE VIII.

FOR RAFTERS OF FLAT AND HIPPED ROOFS.

Supposed load on the square foot horizontal = 50 pounds; this includes the construction, snow and wind loads. Measurement taken from roof plan, independent of slant of roof.

2″ rafters 24″ to center; h = 1 ft. × .6381 (⅔)″ for yellow or white pine.

2″ rafters 20″ to center; h = 1 ft. × .583 (3-5)″ for yellow or white pine.

2″ rafters 16″ to center; h = 1 ft × .5 (½(″ for yellow or white pine.

Collar beams must be inserted for hipped roofs, if rafters are longer than 12 feet; make same one-half the thickness of rafter, but the same width.

APPLICATION OF THE TABLES.

1st Example.—In a dwelling where joists have a clear span (1) = 16 feet, What is the proportionate width (h) for yellow and white pine, for 16″ to center and for 12″?

1st Answer.—16″ to center, yellow pine considered; Table I., shows for h = l × ¾″ = 16 × ¾ = 12″. Thus 2″ × 12″ yellow pine joists placed 16″ to center would answer our case.

2nd Answer.—12″ to center, yellow pine considered; Table I., gives h = l × .66″ or 1 × ⅔″ = 16 × ⅔″ = 10⅔″. In this case 2″ × 10″ yellow pine would suffice, spaced 12″ to centers.

3rd Answer.—16″ to center, white pine considered; again taking from Table I., our factor given for white pine 16″ to centers we find h = l × .8″ or 4-5″ = 16 × .8″ = 12.8″; therefore 2″ × 12″, although a little weak, will do.

4th Answer.—12″ to center, white pine considered; Table I., shows us h = l × .7″ or 7-10 = 16″ × .7″ = 11.2″; 2″ × 12″ should be used, 12″ to centers.

We should not forget to arrange one row of cross-bridging for every 7 ft. of span. In case we get results like answers 2 and 3, one additional row of bridging will make up for the fraction of an inch we neglect to make use of the nearest stock-joists. The bridging does not increase the strength of the joists, but mainly acts to hold them upright and from turning over sideways. In a later paper we will see how bracing with 1″ strips will increase the strength, sometimes employed for wide spans and when the time is too short to get special thicknesses cut by the mills.

2nd Example.—Find the dimensions of ceiling joists required for the span of 15 feet.

From the Table VII. we obtain the formula:

h = l × ¼″ yellow pine, or l × ⅓″ white pine, 16″ to centers; *i. e.*, 15 × ¼″ yellow pine, or 15 × ⅓″ white pine, 16″ to centers.

Thus 2″ × 4″ yellow pine, or 2″ × 6″ white pine would be right. If we try on 12″ centers, Table VII. shows h = l × ¼″ for white pine = 15 × ¼″ = 2 × 4″ white pine, 12″ to centers will answer this case satisfactorily.

3rd Example.—A hipped roof ½ pitch; find the rafters required. Table VIII. is needed. We find l × ⅔″, or l × 3-5″, or l × ½″ for the distance to centers, of 24″, 20″ and 16″ respectively. The house may have a width of 26 feet. To find the length of the rafters we use the Theorem of Pythagoras. "In a right angled triangle the longest side (hypothenuse) is equal to the square root of the sum of the squares of the two small sines," or $c = \sqrt{a2 + b2}$, developed from $c2 = a2 + b2$, where c = the longest side or hypothenuse, a and b the other two small sides (catheti.)

In our example ½ of width of the building = ½ of 26 = 13 feet is one cathetus and the other also 13 feet by ½ rise roof; thus the formula $c = \sqrt{a2 + b2}$ becomes when b = a, $c = \sqrt{a2 + a2} = \sqrt{2a2} = a\sqrt{2}$. This last expression is convenient if a is an irregular number, for the $\sqrt{2}$ is found in most any hand-book like Kidder's on page 8, gives: $\sqrt{2} = 1.4142$, this × a (= 13) = 18.38 feet length of rafters. The formula $c = \sqrt{2a2}$ would have been more convenient here for 2a2 = 2 × 13 × 13 = 338 and the $\sqrt{338}$ = 18.38 ft. found on page 13 of Kidder.

If only an approximate answer for the length of rafters is desired, which would fully satisfy our figuration, we may use the improper fraction 7-5 and multiply one, the equal small sides of our right-angled triangle, thus: 7-5 × 13 = 91-5 = 18 1-5 ft., near enough for our purpose, as we take only the nearest full feet (18) into consideration. h = 18 × ⅔″ = 12″, or 2″ × 12″ rafters, 24″ to centers. h = 18 × 3-5″ = 10 4-5″, or 2″ × 10″ rafters, 20″ to centers. h = 18 × ½′ = 9″, or 2″ × 8″ rafters, 16″ to centers.

The rafters being over 12 ft. in length, it will be required to insert collar-beams. If we get sufficient tie at the foot of the rafters to the joists, we may design the collar-beams 8 ft. above floor. On supposition that outside wall and top of rafter meet in floor height, we obtain the length of the collar-beams as follows: Whole height of roof 13 ft., less 8 ft to bottom of collar-beams = 5 ft. multiplied by 2 = 10 ft., the length of the collar-beams; for twice the rise = span by ½ pitch roofs. This last holds good in this particular case only, but proportion will solve it under all circumstances. Entire height to entire span as is partial height to collar-beam, *i. e.*,

13 : 26 = 5 : X

X × 13 = 5 × 26

$$X = \frac{5 \times 26}{13}$$

= 10 feet.

PERSONAL.

Mr. Chas. A. Bradshaw, a well-known Toronto builder, died on August 5th, age 54 years.

Mr. J. A. Ellis, architect, of Toronto Junction, has lately returned from a visit to the United States.

Mr. Thomas Snarr, a well-known and respected builder of the city of Toronto, died on July 14th.

Mr. Ernest Wilby, who has spent the last two years in the study of architecture in England, has returned to Toronto.

Mr. J. W. Gray, architect, of Toronto, was severely injured a fortnight ago by being thrown from a carriage at Brantford.

Mr. John Wilcox, builder, who had been a resident of Toronto for half a century, died at his residence in that city a couple of weeks ago.

Mr. Fuller, Chief of the Department of Architecture at the Dominion Capital, is enjoying with his family a period of relaxation in the lake district near Peterboro', Ont.

Col. Charles G. Otis, of the Otis Bros. Co., manufacturers of elevators, died at his residence in Brooklyn, on the 7th inst., age 62 years. Col. Otis had been in feeble health for a year or two past.

Mr. Richard M. Hunt, of New York, received from the hands of the President of the Royal Institute of British Architects, on June 19th, the Victoria Royal Gold Medal awarded him by the Institute some months ago.

SANITATION AND LIGHT

EFFECTIVENESS OF HEATING APPARATUS.

THAT there is a wide difference, as pointed out by the *Building Register*, in the effectiveness both of hot-water heating and steam-heating apparatus is a fact known to all well-informed men engaged in the heating trade, but in many instances this difference is accounted for by referring it to anything but the proper cause—namely, defects in the system of piping between the steam boiler or water heater and the radiators. The boiler may be good, the radiators may be the best in the market, yet the result is unsatisfactory. In most such cases it will be found that not enough study and care have been given to arrangement of pipes and radiator connections, to their proper sizes with reference to the surface they are to supply, to their pitch, to the supply in steam-heating pipes of proper relief pipes, to avoidance of traps in pipes, to provisions for expansion under the action of heat, and so on to the end of the chapter. These remarks apply to both large and small installations. Some of these defects are not always chargeable to the contractor who puts in the apparatus. Many buildings, large and small, can be found wherein, when first erected, the heating apparatus worked excellently, but in a year or two began to snap and pound vigorously, while its lack of vigor in heating some parts of the building became uncomfortably apparent to complaining occupants. What has happened during the interval between satisfactory testing and the failure to heat successfully is that the building has settled unequally, thus neutralizing, and in many cases often reversing, the inclination given by the fitter of the pipes and canting radiators so that their outflow connections are higher than their inlets. Examine the boiler; you will find there nothing to prevent efficiency. Radiators and valves, water-feeding and draft-regulating appliances may be all in first rate working order. The fault is that the piping has been disarranged because the building has settled, and settled unequally.

DIRECT-INDIRECT RADIATORS.

OUR German exchanges advertise something which seems to us, says the *American Architect*, to be worth the attention of architects and designers here, in the shape of direct-indirect radiators, formed, not of vertical tubes or castings, as is usual with us, but of horizontal coils. The idea is not new. We have ourselves employed the same arrangement, and have seen it used by others, but the fact that a manufacturing house finds it worth while to make and send out such coils in large quantities suggests the probability that, with a little study, coil radiators might be made with castings put together with bolts as vertical radiators now are, which would heat better, particularly for direct-indirect systems, and be more ornamental. It must be confessed that, so far, no beautiful objects in the shape of vertical radiators have made their appearance in the market. We do not say that they cannot be made, on the contrary, it is possible that a delicate colonnade design might be successfully adapted to such radiators; but the surface-ornamentation hitherto employed has only increased the desire of architects to conceal appliances of the sort as much as possible. With coils, it seems to us that much more might be done. In the German examples, the coil is a flattened spiral, the fresh air introduced from out of doors being brought up through the middle. This is a good shape for circulation, as well as for heating. It is well known that horizontal coils heat much more air, for a given surface, than vertical tubes, and it would be easy, in a cast radiator on this system, to arm the hollow interior of the coils with pins, which must increase their efficiency.

A new hospital building has recently been completed in Owen Sound from the plans of Mr. J. Forster, architect, of that town. Accommodation has been provided for seventy patients and the necessary staff of attendants. The building, which cost $10,500, is three stories in height with a basement, and is constructed of brick. Mr. Alex. Greene was the contractor.

DECORATION AND FURNITURE

ON SOME OF THE ARTS ALLIED TO ARCHITECTURE.

MR. WALTER CRANE, in an excellent paper on the above subject, says:

I fail to see how any art can be wholly taught or learned on general principles, since it is of the nature of art to address itself to particular problems, the conditions of which constantly vary. Certain general principles have been evolved out of collective practice of more or less value no doubt in a general way, but they must always be liable to qualification in their adaption to particular cases.

Nothing of the nature of art can be formulated as an exact science, happily, or the limits of its invention and variety would soon be reached. Art, however, has its scientific side, though the science of art is not exactly scientific or theoretic, but practical, and rather consists in recognizing particular necessities of conditions and materials, and the realizing that the frank acknowledgement of the nature of these conditions and materials leads in all the varieties of design, in association with craftsmanship and architecture, to the highest beauty.

The peculiar beauty of a stained-glass window, for instance, is entirely dependent upon this frank acknowledgement of conditions. A screen of transparent color, a pattern defined and united by leads and held in position by iron bars. Directly any attempt is made to overstep its natural limits—to make it look like a painted picture, to get chiaroscuro and vanishing points, or try to ignore the leading as an essential condition of its existence, the charm and joy of it is lost. There is a distinct character and beauty both in plain-leaded glass, throwing a pleasant network of simple geometric lines over the blankness of window panes. Henry Shaw, in his glazier's book, gives a great variety of delightful leading patterns.

Now, any design for a colored-glass window should, in the first place, be a good arrangement of lead lines, I think, a good pattern in short, whether figure subject or not; and, secondly, a good pattern considered as an arrangement of color or jewelled light.

The artistic designer and maker of a wrought-iron gate, grille or railing, whatever phantasy he might introduce, would never forget the essential requirements of a gate, grille or railing. He would never forget the architectural relation of his work, or rather he would make the chief beauty and inventiveness of his treatment of wrought-iron spring out of that relation.

The practice of modelling in clay designs intended to be carved in wood has, it seems to me, been most destructive of the beauty and character of true wood carving. The same may be said of stone and marble; the essential spirit and go of the thing, the characteristic touch and treatment with each material, in which the designer works, claims as its own, and which is its own particular reason for existing—these are, of course, lost, or turned out of recognition when a copy is made of something already existing in a material and produced by a method totally different.

Much better keep to simple mouldings and plain paintings than bring in ornament which has no character or meaning of its own. We must not confuse the mere spreading of ornament with decoration in its true sense, for design in all its forms may be said to be governed by an architectural instinct of its own, which makes it a harmonious part of the building with which it is united, and which unites it, and puts it in harmony with itself.

William Morris, in calling attention to the work of the designers of the past, recognizes the subtle sense of truth and simplicity, the delight in the beauty of nature around them, which was a perpetual tonic to the toil-pressed craftsman, and without which, no art, past or present, can have meaning or endurance. He says, speaking especially of early Persian art, which in its best development, was decorative art: "In their own way they meant to tell us how the flowers grew in the gardens of Damascus, or how the hunt was up on the plains of Kirman, or how the tulips shone among the grass of the mid-Persian valley and how their souls delighted in it all, and what joy they had in life; nor did they fail to make their meaning clear to some of us. One who has devoted much attention to the study of Greek art, lately remarked on the relation maintained in this masterpiece of mural sculpture between the relieved figures and the ground space; each piece of relief is balanced by an empty space of the same extent, though, of course, different in shape, so that could the *relievo* be compared with the *basso* in the whole design, they would be found to correspond in extent."

PUBLICATIONS.

The name and good-will of *Metal*, of New York, have been sold to Mr. David Williams, who will amalgamate the paper with the *Metal Worker* and the *Iron Age*.

Messrs. S. E. Hendricks & Co., 54 Broadway, New York, have just issued the third annual edition of "Hendricks' Architects' and Builders' Guide and Contractors' Directory of America." The book contains nearly 700 pages and 170,000 names and addresses arranged under 800 classifications. It appears to have been compiled with care, and should prove valuable to architects, manufacturers and supply firms.

LIFTING UP A MASSIVE BUSINESS BLOCK.

THE World's Fair is full of wonderful sights, but it contains nothing so amazing, so thrilling to an observer, or more interesting to the builder, than the scene on Monroe street, Chicago, where a massive stone and brick business block is being raised up bodily a distance of fourteen feet for the purpose of interposing an additional story. The building measures 50 x 106 feet, is six stories in height. The thickness of the walls was inadequate to support an additional story above, and the only alternative was to interpose one story at the ground level, the foundation being sufficient to carry one additional story.

The weight of this building above and including the main floor was found to be 11,440,000 pounds or 5,720 tons, in round numbers twenty-seven pounds to the cubic foot. There are used in the raising of this building 1,800 three-inch jack screws. To operate these screws 132 laborers are required, each one having charge of from eight to twelve screws. At a given siginal on a shrill whistle each man, with an iron bar four feet long, gives each screw a one-quarter turn. The pitch of the screws being five-eights of an inch, each one-quarter turn raises the building three-sixteenths of an inch, and it is found that the immense load of 5,720 tons can be raised three inches an hour. When the screws have been turned from their blocks twelve inches, new support is required, which is secured by a blocking of 6x6 inch timber. The screws, which are twenty-four inches long, are then slackened, the load placed upon the new blocking and the screws set for another turn. At no time is there more than one of the group of twelve screws without a load.

Experience has proved to these self-taught screw engineers that the limit of weight at any time given to one screw should not exceed five tons, although it is known that a strong man with a four foot lever can raise three times this amount. An experiment was once tried as to the breaking strength of one of these screws and it was found that the flange which supports the screw, broke at the extraordinary weight of fifty-four tons. The weight of the building being 5,720 tons and there being 1,800 screws, the proportion of the weight upon each screw is three tons, so that the factor of safety in this piece of work is about eighteen. During the raising of this building careful records are taken and frequent measurements are made to ascertain whether or not the building is raised perpendicularly from the point from which it started. Should any laborer neglect to give the proper turn to the twelve screws under his charge, the result is at once shown by these measurements. This system also insures the exact vertical raising of the building, assuming, of course, that it starts from a level surface. As soon as the building is raised to the intended height—14 feet and 8 inches—the work of building up with steel columns and girders and masonry will be commenced and the building lowered onto its new supports; the interior will then be completed as in an ordinary work.—*Stone.*

TIN ROOFS.

THOSE who are interested in the subject of free trade versus protection duties will find an interesting problem for solution in tin plate and its application for roofing purposes, writes Arthur Seymour Jennings in the *Plumber and Decorator*. Probably one-half of all the roofs in the United States of America are covered with tin plate. Most of it is made in Wales, is exported into America, and a duty is exacted. The subject of tin plate has been discussed at length in the papers, especially in connection with the notorious McKinley tariff; and buckets full of ink have been wasted in trying to arrive at a clear understanding as to whether the American Government are best serving the people in taxing an import so widely used, considering that the material is not made at all in the States, or at least to any extent. Our readers may be familiar with the fact that there have been one or two attempts to start tin plate factories in the States by the aid of workmen obtained from England.

But it is not to enter into a question of tariff that this article is written, but rather to call attention to the somewhat remarkable fact that tin plate, although made at home, is not used at home for roofing purposes. That it forms a very economical roof-covering, the first cost of which is low, and the durability of which is considerable, will readily be conceded by those who have had an opportunity of examining it in use. Why then should it not be used in England? Of course, it can only be applied to roofs that are comparatively flat, but then we have very many flat roofs that are covered with zinc, sheet lead, or copper.

At first thought a number of objections to the use of tin plate will suggest themselves. It may be said that it would not stand the climate, that flat roofs are objectionable in any case, and that even zinc roofs are more frequently in bad order than they are in good. In answer, we may point out that the climate of the United States is much more severe than that of England. In few localities east of the Rocky Mountains is the temperature less than 100 degs. sometimes in summer, or more than several degrees below zero sometimes during the winter. Broadly speaking, it may be said that anything that will stand the climate of America will prove durable in England. This is leaving out certain limestone and other materials that are likely to be injuriously affected by the action of sulphuric acid contained in the air when large quantities of soft coal are burnt, such as is the case in English cities.

Flat roofs are, of course, objectionable, but they are nevertheless a necessity, and if they are to be covered the main object is to render them permanently watertight at the lowest possible cost. The writer claims that this can best be done by the use of tin plate.

As to the durability of tin roofs. When properly laid and painted periodically, they last certainly as long as zinc, in fact, it is claimed that, if the painting is done every second year, they will last indefinitely. The tin is laid without rolls, and usually without laps, the joints being simply soldered together. The usual flashings to the wall are provided, but that is all.

The durability of a tin roof depends largely upon the paint. In the best roofs the under surface of the tin is painted with a single coat and the upper surfaces with three coats. Before the paint is applied any resin adhering is scraped off, and then the whole of the surface is washed clean with benzine to make it entirely free from grease. Some roofers allow the tin to become rusty before applying the paint, on the theory that this will afford a better hold. This practice is, however, entirely objectionable, because the rust once started continues. The cost of painting is not large as a cheap paint is used, made principally of oxide of iron or metallic brown. The application of it does not require the employment of particularly skilled labour.

Considered altogether, it would appear that the merits of tin roofs should claim more attention from house owners and architects than they receive at present.

USEFUL HINTS.

The finest kind of iron tubes ever used to convey gas, steam or water, were seamless drawn steel and brass tubes of almost any diameter and thickness.

HARD AND INATTACKABLE CEMENT.—"Kosmos" gives the following formula for the composition of a cement which sets in four or fived ays, when it becomes so hard as to scratch iron, serving to cover terraces, line fountain basins, and connect blocks of stone. Grind to a fine powder ninety-three parts of crushed brick or well-burnt clay with seven parts of litharge, and mix the powder with sufficient linseed oil to give the consistence of mortar. Before applying the cement, the parts to be covered must be damped with a wet sponge, and if any cracks should show themselves, they must be stopped up with cement.

PRESERVATION OF TIMBER FROM DAMP.—The following preparation is recommended by the *Genie Civil* for preserving timber from the ill effects and deterioration due to damp, while at the same time giving it a clean and pleasing appearance: Sulphur 500 parts, resin 375 parts, and fish oil seventy-five parts are melted together; and, when they are completely dissolved, a small quantity of red or yellow ochre or iron oxide, ground in linseed oil, is added for colouring, the whole being stirred vigorously to ensure a thorough mixture. Two coats of this paint in a boiling state are laid on, the first being allowed to dry thoroughly before the second is applied. It is said that timber thus treated will resist steam and fog as well as damp

HOW TO DRILL GLASS.—A writer in the *Scientific American* describes how to drill a hole in glass: Take a small common three-cornered saw file and break off an inch of the end of it. Then take to a grindstone and grind a blunt point on it, being careful not to hurt the temper. Leave the file in the handle and bore just like you would with an awl. The point of the file should not be longer than the file is thick. Use turpentine as a lubricant, and keep the cutting edges on points of the file sharp with an oil stone. I have bored holes two inches deep in a short time by hand in glass by this method. In boring a plate, I have found it best to bore from both sides, using very light pressure toward the last, always laying the plate solid on a paper bound book.

THE HOLDING POWER OF NAILS.—Relating to tests as to the relative holding power of cut and wire nails, we have, says the *Iron Age*, the following communication from a correspondent in India, who alludes to the effect of time on the holding power of wire nails: "In regard to the tests to be made as to the holding power of cut and wire nails, I wish to say that to make the tests of any value or significance, the work after being nailed should be allowed to stand for a week or two and the nail then drawn. It has been my experience that cases nailed with cut nails are easier to open with a nail puller than the same cases in which steel nails have been used. The cut nail after starting comes out easy, whereas the wire nail holds its full length. Carpenters also say that in taking off shingle roofs that have been nailed with wire nails the shingles break and the nails all remain in the sheeting.

DISPOSITION OF CONCRETE.—When concrete is used to obviate the yieldingness of the soil to pressure, expanse or extent of base is required to answer the end, and to secure this effect, says the *Builder's Reporter*, the concrete being widely spread, should be thick or deep only with reference to its own power of transmitting to the ground the weight of the wall to be built upon it, without breaking across or being crushed. But when concrete is used as a substitute for a wall in carrying a wall down to a low level, it is in fact a wall, wide only in proportion to its comparative weakness in the absence of manipulated bond in its construction, and incased by the strong soil within which it is placed. Whether the proper object be the attainment of a sufficiently-expanded base upon a weak soil, or of the sufficient depth below ground in a strong soil, it may be, to exclude meteoric influences, the erroneous notion is that a foundation is rendered strong in the use of concrete by depth rather than by extent of base, and in consequence of this notion heavy buildings are sometimes jeopardized by the friable concrete foundation being placed on its edge instead of being laid flat to cover the breadth of soil necessary to withstand the weight of the superstructure. Concrete, indeed, is at all times more safely to be regarded as a substance to be placed as a layer than as a substance to be set up as a wall, for although with good materials, careful manipulation and patience, excellent erections as walls may be made of concrete, as erections in the same form may be made of tempered clay, neither concrete nor tempered clay is to be regarded as a proper substance with which to form the lofty walls of buildings in towns.

Messrs. P. G. Waters & Son of Hull, Que., have just completed the construction, for the Public Works Department at Ottawa, of what is said to be the largest lifting dredge in America. Its total length is 152 feet; width, 30½ feet; height, 14 feet, the well being 91 feet 9 inches long and 6 feet wide. The machine is capable of dredging to a depth of 50 feet. It will cost in the neighboorhood of $70,000.